Faculty of Environmental Studies
Project Part 3: Fresh City farms - Food Availability in the City of Toronto

Assessing food availability and food deserts in the City of Toronto with respects to Fresh City Farm's current customers

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Executive Summary

Food security is a global problem that can be solved at the local level. Urbanized areas, such as the City of Toronto, depend heavily on food imports, from within and outside of the country. Without realizing it, we spend much of our efforts and energy getting the food into the city, when we could be spending that effort growing the food within the city. Organizations and businesses, such as Fresh City farms take advantage of this opportunity by growing organic food, in city spaces, and delivering it to the customers or having them pick up their food at selected locations. In this project we looked at the current customers of Fresh City Farms with respects to the current demographics of the City of Toronto. We found that most of the customers live in downtown Toronto which is characterized by a low median age (27-36), low average household size (1.4 - 2.2 persons per household), highly populated (between 6,684 and 60,915 persons per square kilometer) and a mix of median income level ranging anywhere from $23,000 to $239,000. We also studied food availability in Toronto by examining the existing major supermarket chains, the year-round and seasonal farmers' markets, and the community gardens. We concluded that there was a lack of food availability in areas not resided by Fresh City Farm customers. In other words, there exists a lack of fresh food availability in North Etobicoke and East Scarborough. These areas are known as "food deserts". Our recommendation is that Fresh City Farms should consider targeting these areas for new potential customers.

1. Introduction

1.1 Background

Fresh City Farms is a for-profit social enterprise growing and distributing local organic food in Toronto, with their central farm at Downsview Park. Its business is built upon challenging the status quo of our current food production system and a vision of being a thought and market leader in empowering all to make conscious food choices (Fresh City Farms, 2014).

Without any retail outlet, Fresh City offers delivery service of fresh organic produce right to customers' door in a box, through online transactions. It also offers group pickup points in condominiums, apartments and offices at discounted rates. In addition, it has a number of public pick-up locations across Toronto. Its regular weekly bag of produce is price-competitive with Loblaws and Grocery Gateway, providing sustainable, healthy food at affordable price to customers' convenience. The farm itself also offers tours and educational workshops (Fresh City Farms, 2014)

1.2 Objectives

Since Fresh City Farms produce is relatively affordable with the added convenience from delivery services, areas known as "food deserts" can benefit a great deal from Fresh City Farms. These are areas that do not have access to good quality and affordable food (Martin Prosperity Institute, 2010). This report analyzes the spatial dynamic between the existing supply and demand of fresh food in the Toronto urban system.

More specifically, food deserts areas are identified simply by locating where the supply of fresh food, such as supermarkets and markets, are absent. Using GIS analytical tools, demographic and socio-economic characteristics of the study area are also analyzed to understand the needs and demands of the population. Finally, this report seeks to examine Fresh City Farms' current customer base with respect to food

availability in Toronto and recommend potential market areas for business growth, based on the analyses.

2. Methodology

2.1 Literature review

A large body of existing work has been done on spatial analysis of food deserts in other cities. For instance, Peters et al (2011) published a paper, mapping potential foodsheds in New York State by food group in GIS. In their methods, the group mapped production zones using soil and land cover, and mapped consumptions zones using population distribution and demographic data. Analyzing these zones, they determined potential food yield and suitable land use and quantity of food needed (Peters et al., 2011).

McEntee and Agyeman (2010) employed a methodology of identifying rural food deserts in the state of Vermont using GIS, which offers a similar framework for our methodology. They plotted the location of food retailers, residential units and roads using ArcGIS software. While food deserts in a rural setting were defined as areas that are 10 miles or more to a food retailer in their study, 500 metres or more has been commonly cited as the threshold of food desert in an urban setting, which represents an estimated 5 to 7 minutes of walking distance (McEntee & Agyeman, 2010). Eckert and Shetty's (2011) work on using GIS to plan for food retail provides further ground for the methodology used in our study. They measured the accessibility of fresh food retailers in Toledo, Ohio using GIS and examined whether spatial accessibility carrying nutritious and healthy food choices is a concern (Eckert and Shetty, 2011).

A similar study has been done in Toronto by the Martin Prosperity Institute (2010) and it was found that food deserts, using one kilometer as the distance threshold, have been a prominent feature in Toronto's inner suburbs and Priority Neighbourhoods. The methodology used in this study is similar to that used by McEntee and Agyeman, in which they compiled addresses of food retailers and residences and added attribute information taken from census data. Much of the existing work about food deserts has

been largely focused on informing or influencing public policy. However, results of our analysis are presented as market opportunities from a business standpoint.

2.2 Study Area

Toronto, Ontario, Canada

Our study area was the city of Toronto. Toronto is located in Southern Ontario and is the most populous city in Canada. It is composed of four large regions which include: Etobicoke, North York, Scarborough and Toronto. Due to the scope of the project, the analysis will only be done within the boundaries of the city. Please refer to Figure 1. for a map of the study area.

Map Projection - WGS 84

For this project, the World Geodetic System 1984 (WGS 84) datum was applied. The World Geodetic System (WGS) is a standard coordinate system for the Earth and geodetic datum; which defines the size and shape of the earth. WGS 84 (full name WGS 1984, EPSG: 4326) was established in 1984 and last revised in 2004 (NGA, 2014).

This projection was chosen because it is simple to work with and is consistent with the projection of City of Toronto data used in the analysis. In addition, because this coordinate reference system uses latitude and longitude, we were able to plot the data points that we have geocoded by changing the addresses of the points into longitude and latitude coordinates, that could be easily plotted onto the map of the City of Toronto. We have projected our maps on a plane surface. Our goal is to preserve distance and shape.

2.3 Data Description

Below is a brief description of how each of the data files for each layer was either obtained or created.

City of Toronto Ward Boundaries

The City of Toronto Ward boundaries data was downloaded from the Toronto Open Data catalogue at: www.Toronto.ca/Open. The data came in an ESRI shapefile with polygon features. After it was downloaded, the file was opened in Quantum GIS (QGIS). This file was used as the basemap for the project, where all of the other data would be displayed.

Census Boundaries

The Census boundary files were downloaded via the Statistics Canada website, from a resources section of the website called “2011 Census”. Toronto was selected and an ArcGIS Shapefile (.shp) was downloaded. This shapefile was exported and then imported in QGIS.

Census Tract Data

The Census Tract Data was downloaded via the CHASS Canadian Census Analyser which allowed us to select the category and variables that we wanted to include in our project. Population, age, income and household size data was downloaded as dBase files (.DBF), which was then converted into a Microsoft Excel Spreadsheet and added as a Delimited Text file (.csv) on QGIS. Please refer to Table 3. for the formatted data table.

Supermarkets

Food retailer locations were taken from the retailer’s official websites. GPS coordinates for these addresses were found using Google Maps. This information was compiled into an Excel file which was then converted into a delimited text .csv file. This file was used to create a point layer in QGIS. Please refer to Table 4. for the formatted data table.

Farmers' Markets

Addresses of seasonal and year-round farmers' markets were acquired from Toronto Farmers' Markets Network (TFMN). Without information on exact coordinates, addresses were compiled in Excel and then manually inputted in QGIS to create a point layer shapefile. Please refer to Table 5. for the formatted data table.

Community Gardens

The City of Toronto Community Garden Program has a record of registered community gardens across the city. The addresses were again compiled in Excel and inputted in QGIS to create a point layer shapefile. Please refer to Table 6. for the formatted data table.

Fresh City Farms Customer Locations

The customer locations were given by Ran Goel via e-mail. Due to privacy issues with regards to personal data distribution, only postal codes were given. On February 24, 2014 a list of 1,380 postal codes were received in a Delimited Text file (csv.) format. Please refer to Table 7. for the formatted data received.

Fresh City Farms Pick-Up Locations

The Fresh City pick-up locations were made available publicly from the company's website at: http://www.freshcityfarms.com. The addresses of each pick-up location was provided which corresponded with a unique coordinate point, which was then added to a Delimited Text file (csv.). Please refer to Table 9. for the formatted data table.

Priority Investment Neighbourhoods

The City of Toronto has ranked its 140 neighbourhoods with an equity score based on 15 criteria that includes health, economics, political participation and education (Doolittle 2014). The 31 lowest scoring neighbourhoods have been deemed of priority investment. Toronto Open Data had no shapefile for Toronto's 140 neighbourhoods, and the database's shapefile for Toronto Priority Investment Neighbourhoods was from 2009. This file was edited to remove neighbourhoods no longer considered priority and to add

the many neighbourhoods which had been added since 2009 using QGIS's "create polygon" tool. Information on the boundaries for Toronto's neighbourhoods was used from Toronto Demographics.

Metadata

Please see Table 1. for the metadata for each of the layers.

2.4 Data Limitations

A fews limitations of the dataset and the methodology may have undermined the accuracy and confidence of the analysis results. Since data are from various different sources, they represent information from different years. They are meant to convey a general current trend, not necessarily the most up-to-date situation.

The datasets of food availability, including supermarkets and farmers' markets, were manually built from scratch and might have encountered errors of missing markets or supermarkets that do in fact exist in our study area. The census data also contain NULL values of income, age and household size for a few census tracts that have low population counts.

Due to privacy reasons, we were only given postal codes for current Fresh City Farm customer locations, which means that the points of the customer locations indicated on the map may not be 100% geographically precise and may be slightly off. Also, there were six postal codes provided that were invalid and therefore could not be added to the analysis.

Lastly, we were only given some directions from Ran Goel (the founder of Fresh City Farms) on what data was wanted and therefore the group had to make some decisions on what to include and what to exclude in the project scope. For instance, there was a lot of thought put into what was considered to be a supermarket and what was not. Therefore, there may be some food retailers that were excluded from the data.

2.5 Analysis

The group used a variety of analysis types, tools and processes to analyze the data. Below is a brief overview.

Overlays

Two types of overlay analyses were conducted during our project. The first was a point-in-polygon overlay, where point features were overlayed on polygon features. The point features were locations of supermarkets, farmers' markets, community gardens, Fresh City Farm customer and pick-up locations, which were placed on the Toronto city wards polygon feature layer. The second type of overlay, was a polygon-in-polygon overlay. The Census Boundary polygons were overlayed on the City of Toronto polygon.

Density

We were also able to determine things by identifying where there was a high density of points. For example, we noticed that Fresh City Farm customers were clustered in the Downtown core area, while in other locations they were more spread out.

Buffers

One kilometer (km) buffers were placed around supermarkets, year-round farmers' markets, and Fresh City Farms pick-up locations. Seasonal farmers' markets and community Gardens were excluded from this, despite their recognized importance, because their food supply is not available all year. After the one kilometer (km) buffers were created around the points, we merged them into one "superbuffer" layer. This allowed us to indicate where there was a lack of food availability throughout the city (i.e. the areas not covered by the buffer layer).

Spatial Joint

Socio-economic data such as population density, median age, median individual income and average household size, were joined to the census tract boundaries layer as an attribute table using the unique census tract ID as the common identifier. They were then displayed using graduated quantiles.

3. Results

3.1 Customers Locations

One of the main questions that guided our analysis was the demographics of the current Fresh City customers. Ran Goel wanted to know the demographics, in terms of median age, median income by individual and household size.

Fresh City Farm's customers are spread out across the entire city. As of February 2014, Fresh City had 1,380 total customers with 1,315 falling within the limits of the City of Toronto. Because the study area and the scope of our work was in Toronto, we only did analysis on the 1,315. It is important to note that 6 customers had invalid postal codes and that these customers could not be identified as being either inside or outside the limits of the city.

One of the request from Fresh City Farm's was to identify the number of customers that resided in each city ward. Please refer to Table 8 for a count of the the customers per ward. It is noteworthy to mention that the majority of the customers reside in downtown Toronto, with 182 in Trinity-Spadina (20), 160 in Trinity-Spadina (19), and 101 in Toronto-Centre Rosedale (28). Notably, the least amount of customers were located in Scarborough and Etobicoke with 0 customers in Scarborough-Agincourt (39), Scarborough-Agincourt (40) and Scarborough East (44), and 0 in Etobicoke North (1).

3.2 Population and Demographic Analysis

The most populated area in the city is downtown Toronto. If we look at Figure 8., most of downtown Toronto has anywhere from 6,684 - 60, 915 people per square kilometer. This area, is also where most of the Fresh City Farm customers are located. We also see very "patchy" populated areas in Scarborough, Etobicoke and North York. These

patches of highly populated census tracts in inner suburbs are most likely dominated by apartment or condominium towers.

As of 2011, the median age in the City of Toronto was 39 years old. Areas in the downtown and downtown west have a younger median age than some areas in the outskirts. Areas in southwestern Etobicoke, northern edge of the City between Scarborough and North York and along Scarborough Bluffs tend to be an older population.

Areas in midtown along the Yonge corridor, along Lakeshore, Scarborough bluffs and South Etobicoke tend to have wealthier populations. Lower median income areas include downtown west, Etobicoke north and most parts of Scarborough.

It also appears that the closer it is to downtown, the smaller the average household size is. Downtown toronto is characterized as having an average persons per household of 1.4 - 2.2. In Northern Etobicoke and most of Scarborough, the household size average is anywhere from 2.7 - 4.3 persons per household.

3.3 Food availability/inavailability

Looking at Figure 10., it is evident where the food availability is low. The food deserts are apparent in North Etobicoke and East Scarborough. These are the areas that are not covered by our one kilometer (km) buffer and that represent a further distance from available food sources. These areas also either overlap or are spatially close to areas with lower median income, higher median age and larger household size than the City as a whole.

4. Discussion

The analysis results found that food deserts tend to be located in areas of low-income and low socio-economic status in inner-suburbs of Toronto, particular Scarborough and north Etobicoke. This is consistent with existing knowledge about food deserts and its association with low-income populations as found in Eckert and Shetty's study (Eckert & Shetty, 2011). Toronto's situation of food availability/inavailability has been well documented by Martin Prosperity Institute and this report confirms their findings.

Yet, Fresh City Farms' current customers are concentrated in areas where food options are abundant in comparison, due to higher population density in downtown. The food deserts in Toronto inner suburbs present an enormous opportunity for growth for Fresh City. Besides having lower income, these neighbourhoods also tend to have larger household size, which will benefit from grocery delivery in bulk. Moreover, some of these inner suburbs also have older population, which can be associated with mobility issues and further affects their accessibility to food sources. Although the Scarborough and Etobicoke generally have a lower population density than downtown, some of these areas have highly populated apartments where bulk delivery can benefit them the most. As subscription to Fresh City services is self-initiated, the next step would be a matter of marketing Fresh City and raising awareness about conscious, sustainable food choice in these areas.

As Toronto inner suburbs have been getting more attention in City of Toronto Tower Renewal and Priority Neighbourhood initiatives, partnership opportunities with the City and local community groups will help market Fresh City and raise awareness about conscious food choice in these food desert areas. Toronto Public Health is also launching a pilot Corner Store initiative in Scarborough to provide the area with better accessibility to healthy food and is looking to partner with the private sector to deliver their goals (City of Toronto, 2013).

5. Conclusion & Recommendations

Our report showed that most of the Fresh City customers are located in downtown Toronto, including Etobicoke and North York. There are very few customers in Scarborough and the boundaries of Etobicoke. The downtown area of Toronto is characterized demographically by median age, average household size, median income and population density. We analyzed the demographics of the highest concentration of customers and concluded that the area was dominated by a population between 27-36 year sold, which can be noted as “young adults”. Additionally, this area is formed of household with 1.4 to 2.2 persons per household and is highly populated, which a population size ranging from 6,684 - 60,915 persons per square kilometers. Surprisingly, the downtown Toronto area experiences a mix of average income in its population. No range of income was predominant in the downtown core, which results in income ranging anywhere from $23,000 to $239,000 per person per year.

In conclusion, the analysis shows that there is a high potential for Fresh City Farms business to expand. These areas include Toronto’s food deserts and also neighbourhoods of high priority. The food deserts in Toronto are located in Northern Etobicoke and Eastern Scarborough, as they are areas with low accessibility to fresh food sources. High priority areas include the following neighbourhoods: Jamestown, Jane-Finch, Weston-Mt. Dennis, Flemingdon Park-O’Connor, Dorset Park, Eglinton East Kennedy Park, Scarborough Village and Kingston-Galloway.

Toronto’s low income suburbs and low food accessibility have been well documented by the City and relevant policy think-tank and actions are underway to tackle some of these problems. Tower Renewal, Priority Neighbourhoods and Corner Store initiatives are some of the examples (City of Toronto, 2013). Being a for-private social enterprise, Fresh City Farms has a lot to offer to complement these efforts, especially when these City initiatives often seek private sector partnerships.

6. Appendix (Tables and Maps):

Table 1. Metadata for all layers

Layer Name	Storage Type	Provider	Source
City of Toronto Wards	ESRI Shapefile	OGR data provider	City of Toronto http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=b1533f0aacaaa210VgnVCM1000006cd60f89RCR
Census Data and Boundaries	ESRI Shapefile	OGR data provider	Statistics Canada Open Data http://data.gc.ca/data/en/dataset
Fresh City Farms Customer Locations	Delimited text file	N/A	N/A
Fresh City Farms Pick-Up Locations	Delimited text file	N/A	N/A
Supermarkets	Delimited text file	N/A	N/A
Community Gardens	Microsoft Excel	OGR Data provider	City of Toronto http://www1.toronto.ca/wps/portal/contentonly?vgnextoid=8148dada600f0
Farmers' Markets Layer	Microsoft Excel	OGR Data provider	Toronto Farmers' Market Network (TFM http://tfmn.ca/?page_id=76

Table 2. City of Toronto Ward Boundaries

OBJECTID	GEO_ID	NAME	SCODE_NAME	LCODE_NAME
19	14630044	Etobicoke North (1)	1	WE01
25	14630045	Etobicoke North (2)	2	WE02
38	14630047	Etobicoke Centre (3)	3	WE03
34	14630046	Etobicoke Centre (4)	4	WE04
43	14630048	Etobicoke-Lakeshore (5)	5	WE05
44	14630049	Etobicoke-Lakeshore (6)	6	WE06
11	14630040	York West (7)	7	WE07
9	14630039	York West (8)	8	NO08
16	14630043	York Centre (9)	9	NO09
15	14630038	York Centre (10)	10	NO10
24	14630017	York South-Weston (11)	11	WE11
28	14630021	York South-Weston (12)	12	WE12
325	14630023	Parkdale-High Park (13)	13	WE13
329	14652634	Parkdale-High Park (14)	14	SO14
21	14630019	Eglinton-Lawrence (15)	15	NO15
20	14630042	Eglinton-Lawrence (16)	16	NO16
326	14653066	Davenport (17)	17	WE17
36	14630056	Davenport (18)	18	SO18
321	14630055	Trinity-Spadina (19)	19	SO19
40	14630053	Trinity-Spadina (20)	20	SO20
32	14630020	St. Paul's (21)	21	SO21
31	14630050	St. Paul's (22)	22	SO22
8	14630037	Willowdale (23)	23	NO23
5	14630035	Willowdale (24)	24	NO24
13	14630010	Don Valley West (25)	25	NO25
23	14630012	Don Valley West (26)	26	NO26
35	14630051	Toronto Centre-Rosedale (27)	27	SO27
39	14630054	Toronto Centre-Rosedale (28)	28	SO28
26	14630015	Toronto-Danforth (29)	29	SO29

Table 3. Census Tract Data

CTUID	Household	Median($)	Average($)	Population	PopDensity	Median Age	AvNumPH
5350802.02	1745	113687	133968	5350	2367.5	45.4	3
5350802.01	1275	98674	116597	3976	1822.2	41.4	3.1
5350378.28	1935	79836	90312	7451	3360.8	36.4	3.8
5350378.27	1485	71210	82457	5627	281.2	33.5	3.8
5350378.26	1085	85325	98623	4675	2873.9	34	4.2
5350378.25	1795	78296	89036	7558	1586.1	32.7	4.3
5350378.24	2165	45664	61843	6406	2533.2	46.4	2.8
5350378.23	1325	65135	82271	4248	2776.3	46.2	3.2
5350378.22	960	74723	88001	3640	6842.1	40.5	4.1
5350378.21	970	71661	84344	3627	5167.4	41.3	3.7
5350378.2	770	47767	51964	2263	20666.7	42.3	2.9
5350378.19	1335	71436	82920	5223	1159.6	40.3	3.7
5350378.18	1100	46208	53672	2881	31659.3	41.7	2.6
5350378.17	910	52465	67213	3499	7380.3	31.1	3.8
5350378.16	1930	58220	72710	6438	10143.4	36.9	3.3
5350378.14	1165	63664	71332	4074	4384.9	37.3	3.5
5350378.12	1765	47265	57320	5293	6752.1	37	2.9
5350378.11	1700	53138	65160	5874	6098.4	34.2	3.5
5350378.08	1965	61436	70733	6571	7419	42.4	3.3
5350378.07	2235	60466	72712	7281	2600.2	40.9	3.2
5350378.06	1705	59492	68274	6252	3491.6	34.1	3.7
5350378.05	1255	60628	64325	4028	5536	35	3.4
5350378.04	1735	61135	70942	6109	4776	34.2	3.5
5350378.03	2410	64018	73996	7593	3440.6	36.1	3.1
5350378.02	935	57139	72189	3374	3184.5	38.7	3.6
5350377.07	1415	62566	78029	5162	6750.4	44.5	3.4
5350377.06	980	63852	81192	3856	7534.2	39.7	3.9
5350377.04	1670	72495	81510	6114	6920.2	41.3	3.7
5350377.03	850	73609	83244	2866	4407.9	44.1	3.4

Table 4. Supermarkets

Name of the Supermarket	Longitude	Latitude
Bloor Street Market	-79.388549	43.669773
Costco	-79.507317	43.622597
Costco	-79.457946	43.73032
Food Basics	-79.510504	43.721506
Food Basics	-79.325769	43.760476
Food Basics	-79.494223	43.676811
Food Basics	-79.346958	43.705647
Food Basics	-79.339784	43.6692
Food Basics	-79.349806	43.690585
Food Basics	-79.3721	43.667887
Food Basics	-79.240696	43.792424
Food Basics	-79.204898	43.782976
Food Basics	-79.269779	43.808759
Food Basics	-79.285437	43.747796
Food Basics	-79.18626	43.769548
Food Basics	-79.416534	43.786719
Fortinos	-79.447692	43.716477
FreshCo	-79.484677	43.666198
FreshCo	-79.466578	43.692913
FreshCo	-79.426762	43.643303
FreshCo	-79.365755	43.659754
FreshCo	-79.28485	43.687901
FreshCo	-79.283567	43.719015
FreshCo	-79.251494	43.774007
Loblaws	-79.379649	43.661998
Loblaws	-79.36973	43.644655
Loblaws	-79.401556	43.647611
Loblaws	-79.358374	43.675341
Loblaws	-79.421365	43.671872
Loblaws	-79.393859	43.688401
Loblaws	-79.435804	43.656501
Loblaws	-79.415223	43.684014
Loblaws	-79.328261	43.660225
Loblaws	-79.370768	43.696514
Loblaws	-79.412332	43.768708
Loblaws	-79.38731	43.769339
Loblaws	-79.4044	43.734608
Loblaws	-79.418686	43.730691
Loblaws	-79.370808	43.696393
Loblaws	-79.359803	43.700522
Loblaws	-79.45301	43.694879

Table 5. Farmers' Markets

Seasonal Market Name	Address
Appletree in the Village Market	220 June Rowlands Park
Appletree Uptown Market	2384 Yonge Street
East York Civic Centre Farmers Market	850 Coxwell Avenue
Etobicoke Civic Centre Farmers Market	399 Bloordale Gardens
Fairmount Park Farm Market	1725 Gerrard Street East
Fairview Mall Farmers Market	1800 Sheppard Avenue East
John St. Farmers Market	197 John Street
Junction Farmers Market	2960 Dundas Street West
Leslieville Farmers Market	20 Woodward Avenue
Metro Hall Farmers Market	55 John Street
North York Civic Centre Farmers Market	5100 Yonge Sreet
Riverdale Farm Farmers Market	201 Winchester Street
Sick Kids Hospital Farmers Market	555 University Avenue
Stonegate Farmers Market	150 Berry Road
Toronto City Hall Farmers Market	100 Queen St. West
Trinity Bellwoods Farmers Market	1053 Dundas Street West
University of Toronto Scarborough Farmers Market	1265 Military Trail
Withrow Park Farmers Market	725 Logan Avenue, Riverdale
Regent Park Farmers Market	Regent Park Boulevard
Sherway Gardens Farmers Market	25 West Mall
Ryerson University Farmers Market	297 Victoria Street
Weston Farmers Market	1865 Weston Road
Humber Bay Shores Farmers' Market	2225 Lake Shore Boulevard West
Bloor-Borden Farmers Market	365 Lippincott Street
CityPlace Farmers Market	95 Fort York Boulevard
East Lynn Farmers Market	East Lynn Park
Liberty Village Farmers Market	34 Hanna Avenue

Market Name	Address
Dufferin Grove Organic Market	873 Dufferin Street
Evergreen Brick Works Farmers Market	550 Bayview Avenue
Montgomerys Inn Farmers Market	470 Dundas Street West
St. Lawrence Market North	92 Front Street East
Sorauren Farmers Market	50 Wabash Avenue
The Stops Wychwood Barn Farmers Market	601 Christie Street
Toronto Botanical Garden Organic Farmers Market	777 Lawrence Avenue East

Table 6. Community Gardens

Community Garden	Address
Panorama Park Community Garden	31 Panorama Centre
Jamestown Community Garden	10 Rampart Road
Bell Manor Park Community Garden	1 Bayside Lane
New Horizons Community Garden	3216 Bloor Street West
Cronin Park Community Garden	34 Lorene Drive
Oakdale Community Garden	350 Grandravine Drive
Rockford Park Community Garden	70 Rockford Road
Emmett Ave. Community Garden	101 Emmett Avenue
Rockcliffe Demonstration and Teaching Garden and Greenhouses	301 Rockcliffe Boulevard
Peer Nutrition Community Garden	302 Rockcliffe Boulevard
Rockcliffe Juniors' Garden	303 Rockcliffe Boulevard
Unison Health & Community Services Community Garden	5 Foxwell Avenue
HOPE Garden	212 Cowan Avenue
Youth Garden	186 Close Avenue
Leila Lane Community Garden	2 Flemington Road
Amaranth Community Garden	2 Flemington Road
Flemington Community Garden	103 Flemington Road
Varna Community Garden	2 Flemington Road
Lawrence Heights Community Garden	5 Replin Road
Eglinton Park Heritage Garden	200 Eglinton Ave. West
Earlscourt Park Community Garden	1200 Lansdowne Avenue
Perth - Dupont Community Garden	360 Symington Avenue
Dufferin Grove Community Gardens	875 Dufferin Street
Trinity Bellwoods Community Garden	1053 Dundas Street West
Fred's Wildflower Garden	155 Roxton Road
Irene Park Horticulture Community Garden	760 Shaw Street
Northumberland Community Garden	770 Ossington Avenue
Christie Pits Community Garden	750 Bloor Street West
Huron St. Garden	180 Huron Street
Alexandra Park Diversity Garden	275 Bathurst Street
Scadding Court Urban Agriculture Program	707 Dundas Street West
Alex Wilson Community Garden	552 Richmond Street West
Hillcrest Park Community Garden	950 Davenport Road
Garrison Creek Park Community Garden	1090 Shaw Street
Cedarvale Park Community Children's Garden	443 Arlington Road
Frankel Lambert Park Community	340 Christie Street
Ben Nobleman Park Community Orchard	1075 Eglinton Avenue West
Flemingdon Park Community Garden	150 Grenoble Drive
Thorncliffe Park Garden Club Community Garden	50 Beth Nealson Drive
Thorncliffe Family Garden	46 Thorncliffe Park Drive
Moss Park Community Kitchen Garden	150 Sherbourne Street
Winchester Square Park Community Garden	474 Ontario Street
Prospect St. Community Garden	35 Prospect Street
Greenwood Park Community Garden	150 Greenwood Avenue

Table 7. Fresh City Farms Customer Locations

City	Postal Code	Longitude	Latitude
Etobicoke	M9W7J4	-79.619777	43.728777
Etobicoke	M9V2A8	-79.597654	43.741339
Etobicoke	M9V3J4	-79.595522	43.744636
Etobicoke	M9C4W8	-79.583208	43.653779
Etobicoke	M9C5S6	-79.581507	43.661386
Etobicoke	M9C4N5	-79.57786	43.664535
Etobicoke	M9W6K1	-79.570615	43.691423
Etobicoke	M9W1C4	-79.567423	43.697636
Toronto	M9R0A3	-79.566601	43.676269
Etobicoke	M9C1Z4	-79.562989	43.635596
Etobicoke	M9B3E1	-79.562759	43.668766
Etobicoke	M9R3L1	-79.562212	43.679962
Etobicoke	M9V2W3	-79.561702	43.738391
Etobicoke	M9R2C4	-79.561697	43.687315
North York	M9L2C3	-79.560775	43.752631
Etobicoke	M9B5K7	-79.558851	43.673438
Toronto	M9C0A3	-79.557865	43.610097
Toronto	M4P1T6	-79.555941	43.668503
Etobicoke	M9B1K6	-79.554216	43.636727
Etobicoke	M8W4T2	-79.553069	43.602887
Etobicoke	M9B4J7	-79.54728	43.648158
Etobicoke	M9P3V6	-79.546816	43.709009
Etobicoke	M9P3V6	-79.546816	43.709009
Etobicoke	M9W3P9	-79.543307	43.713859
Etobicoke	M9A1H6	-79.537738	43.650835
Etobicoke	M9P2C5	-79.535904	43.694454
Etobicoke	M9A2G4	-79.535691	43.64871
Etobicoke	M8W3J3	-79.533121	43.592993
Etobicoke	M8W3J1	-79.532938	43.592118

Table 8. Customers per Ward (count)

Ward Name	Customer Count
Etobicoke North (1)	3
Etobicoke North (2)	9
Etobicoke Centre (3)	7
Etobicoke Centre (4)	7
Etobicoke-Lakeshore (5)	21
Etobicoke-Lakeshore (6)	28
York West (7)	2
York West (8)	12
York Centre (9)	11
York Centre (10)	19
York South-Weston (11)	11
York South-Weston (12)	11
Parkdale-High Park (13)	54
Parkdale-High Park (14)	62
Eglinton-Lawrence (15)	13
Eglinton-Lawrence (16)	30
Davenport (17)	38
Davenport (18)	83
Trinity-Spadina (19)	160
Trinity-Spadina (20)	182
St. Paul's (21)	36
St. Paul's (22)	59
Willowdale (23)	31
Willowdale (24)	12
Don Valley West (25)	27
Don Valley West (26)	11
Toronto Centre-Rosedale (27)	101
Toronto Centre-Rosedale (28)	74
Toronto-Danforth (29)	24
Toronto-Danforth (30)	57
Beaches-East York (31)	18
Beaches-East York (32)	52
Don Valley East (33)	11
Don Valley East (34)	7
Scarborough Southwest (35)	6
Scarborough Southwest (36)	4
Scarborough Centre (37)	5
Scarborough Centre (38)	9
Scarborough-Agincourt (39)	0
Scarborough-Agincourt (40)	0
Scarborough-Rouge River (41)	3
Scarborough-Rouge River (42)	1
Scarborough East (43)	4
Scarborough East (44)	0
Total Customers	**1315**

Table 9. Fresh City Farms Pick-Up Locations

Pick-Up Location Name	Longitude	Latitude
401 RichmondStreet	-79.393977	43.647698
Downsview Park	-79.48598	43.743305
Artisansat Work	-79.313053	43.685874
Bolt Fresh Bar	-79.425362	43.64297
iDeal Coffee	-79.420341	43.648342
iDeal Coffee	-79.404119	43.731709
iDeal Coffee	-79.443282	43.646316
Merchants of Green Coffee	-79.353967	43.659984
Patagonia	-79.396694	43.645274
So Into Cupcakes	-79.234199	43.776029
Stasis Preserves	-79.451739	43.653256
Sweet Woodruff	-79.412267	43.651036
The Depanneur	-79.429321	43.652971
The Detox Market	-79.392749	43.645899
Tories Bakeshop	-79.29035	43.672184
Toronto Vegetarian Association	-79.392872	43.656092

Final Maps

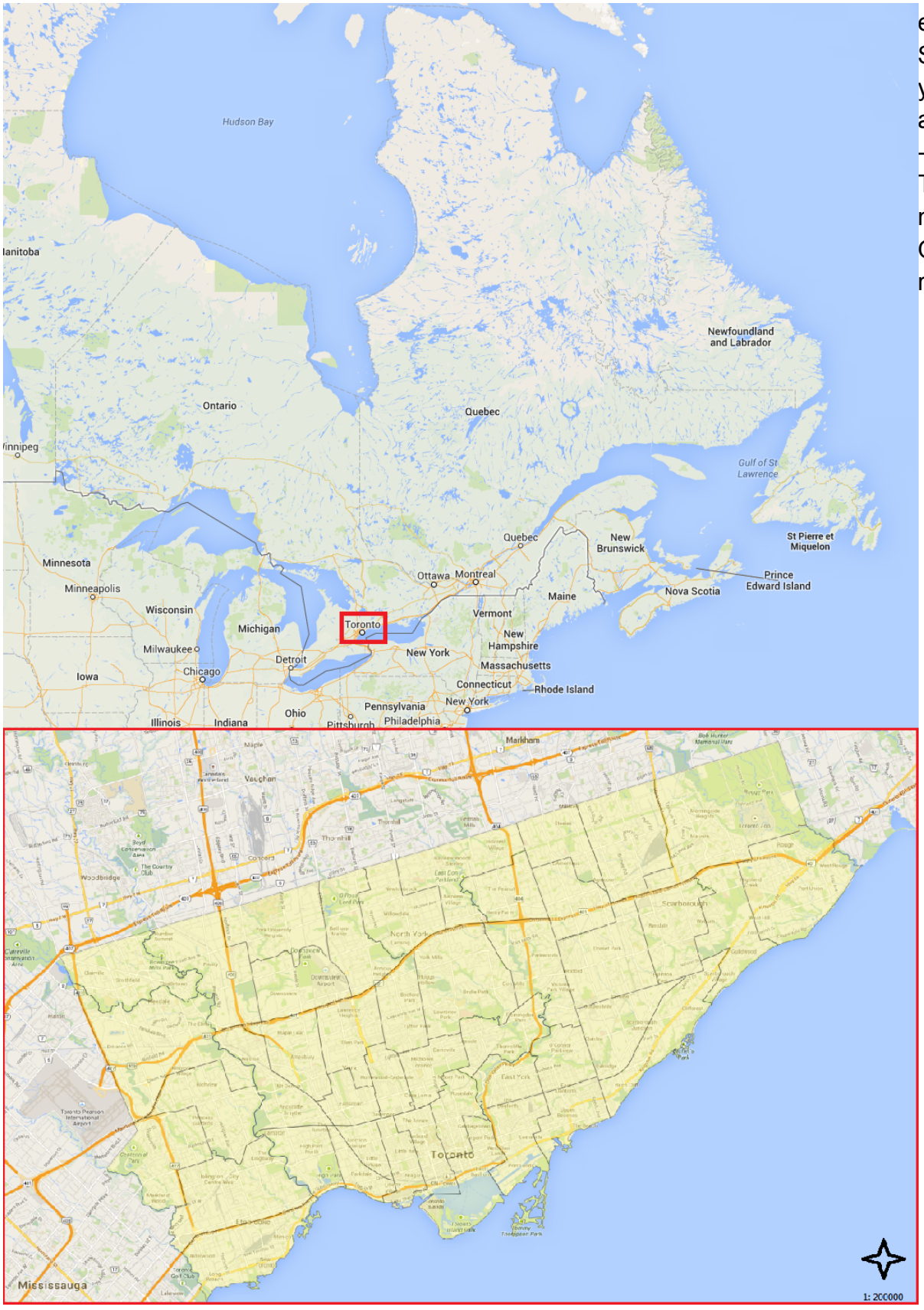


Figure 1. Study area - Toronto, Ontario

Figure 2.

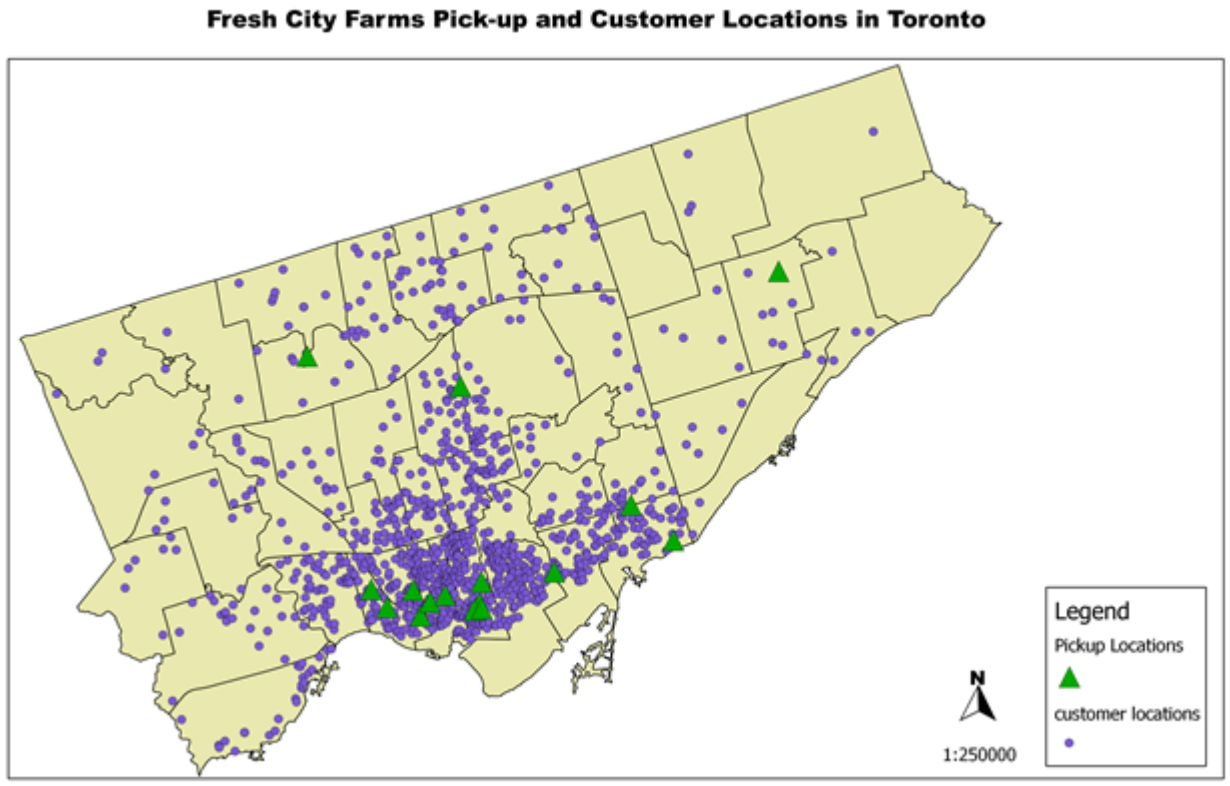


Figure 3.

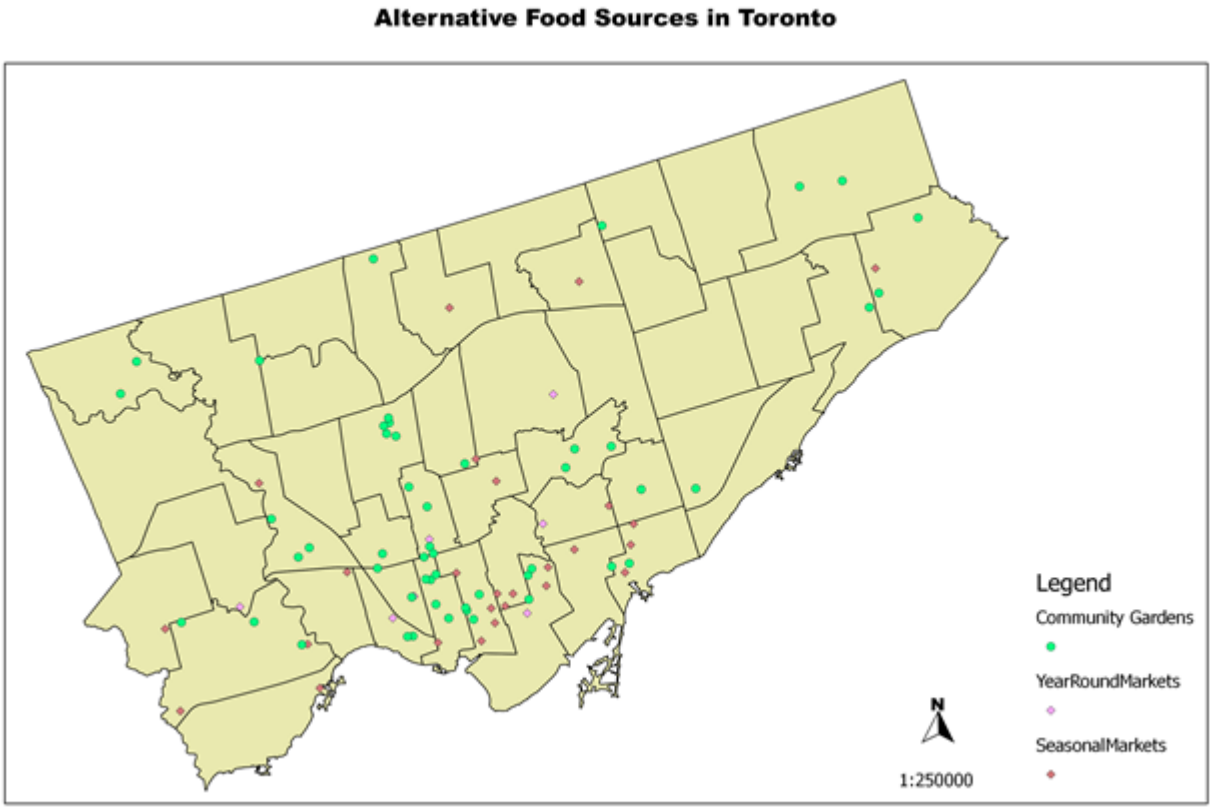

Alternative Food Sources in Toronto
Legend
Community Gardens
YearRoundMarkets
SeasonalMarkets
N
1:250000

Figure 4.

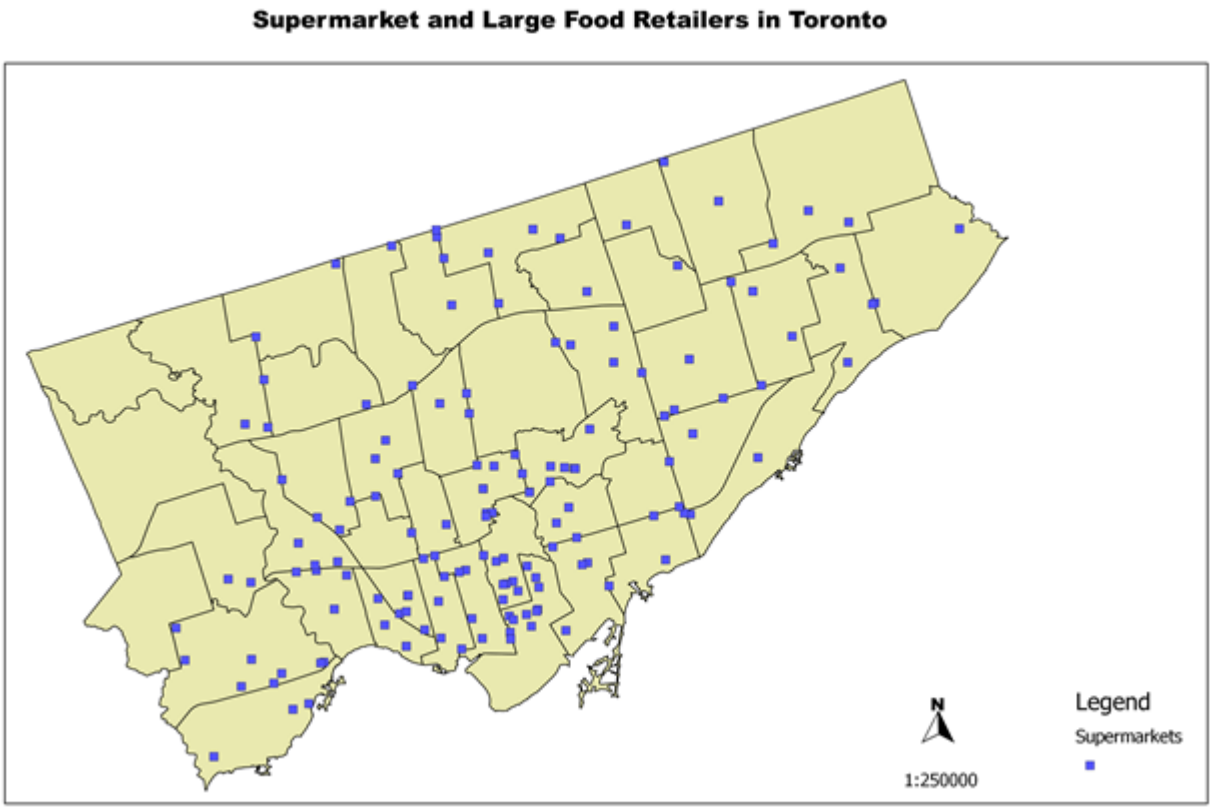

Supermarket and Large Food Retailers in Toronto
N
1:250000
Legend
Supermarkets

Figure 5.

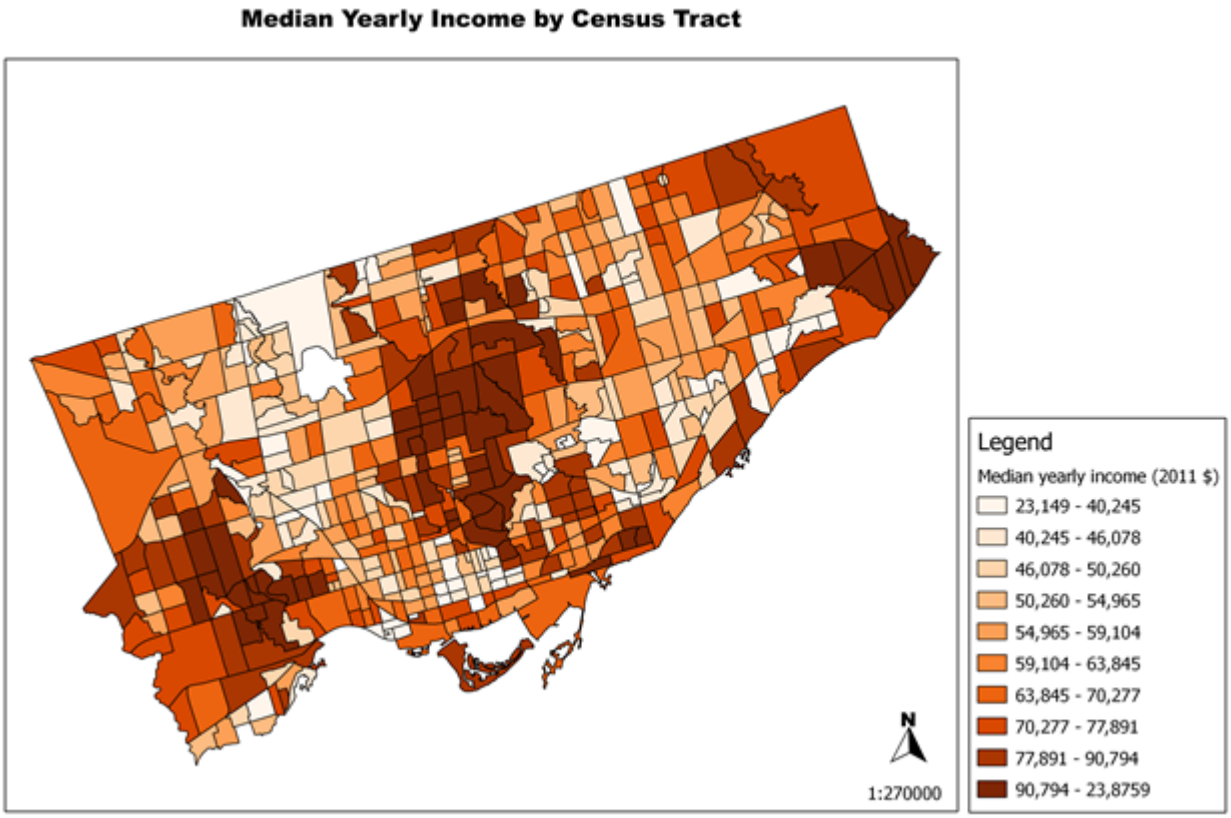

Median Yearly Income by Census Tract
Legend
Median yearly income (2011 $)
23,149 - 40,245
40,245 - 46,078
46,078 - 50,260
50,260 - 54,965
54,965 - 59,104
59,104 - 63,845
63,845 - 70,277
70,277 - 77,891
77,891 - 90,794
90,794 - 23,8759
N
1:270000

Figure 6.

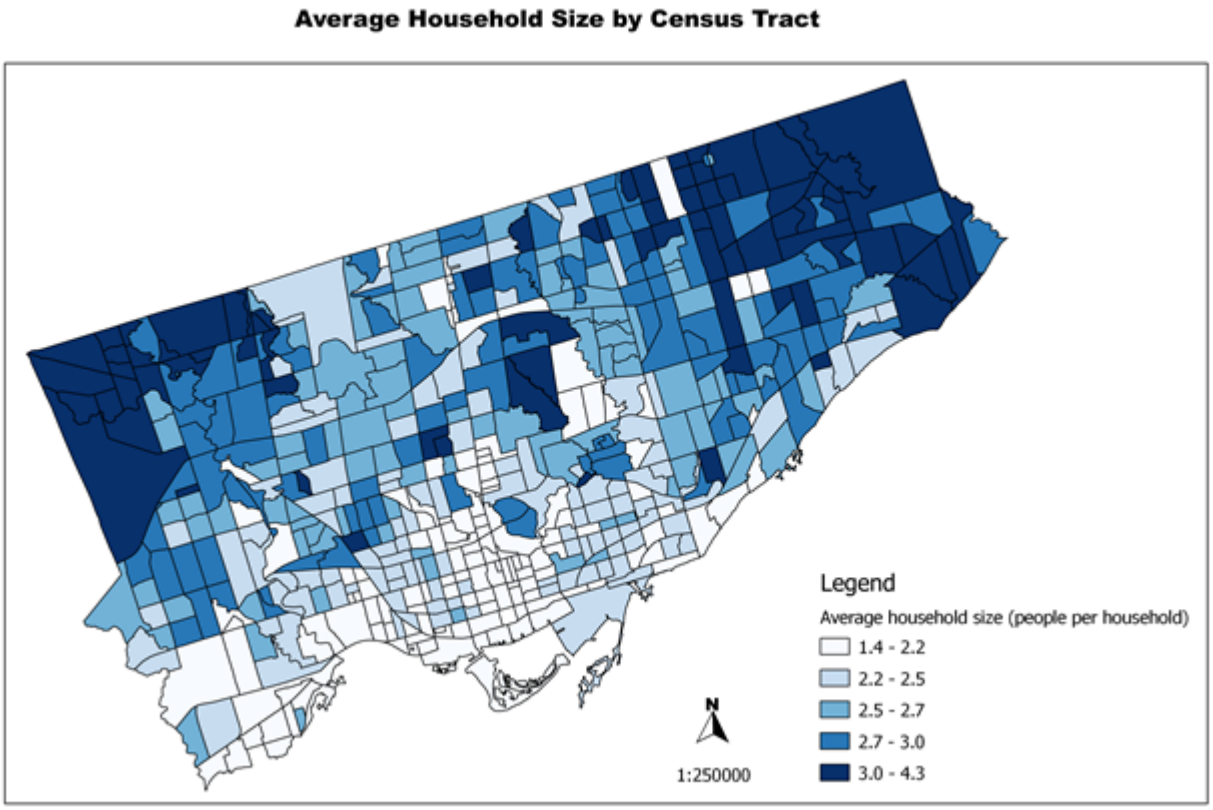

Average Household Size by Census Tract
Legend
Average household size (people per household)
1.4 - 2.2
2.2 - 2.5
2.5 - 2.7
2.7 - 3.0
3.0 - 4.3
N
1:250000

Figure 7.

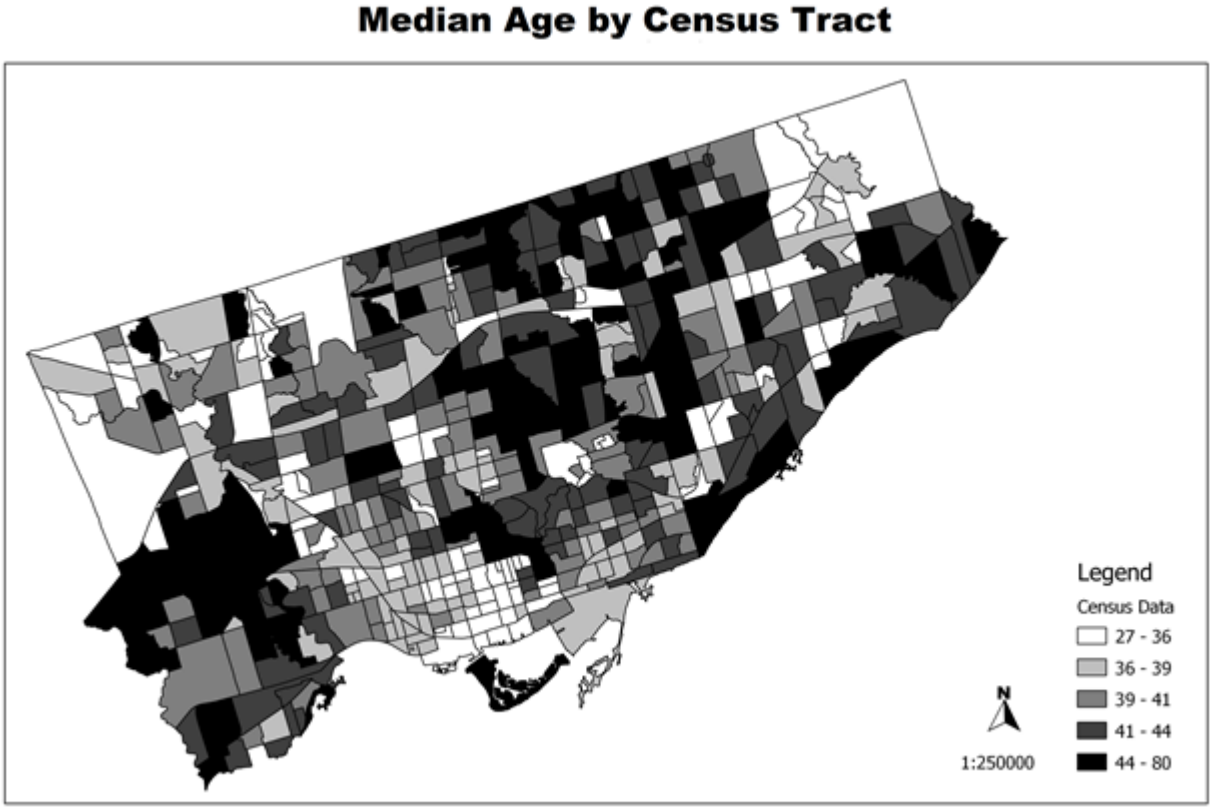

Median Age by Census Tract
Legend
Census Data
27 - 36
36 - 39
39 - 41
41 - 44
44 - 80
N
1:250000

Figure 8.

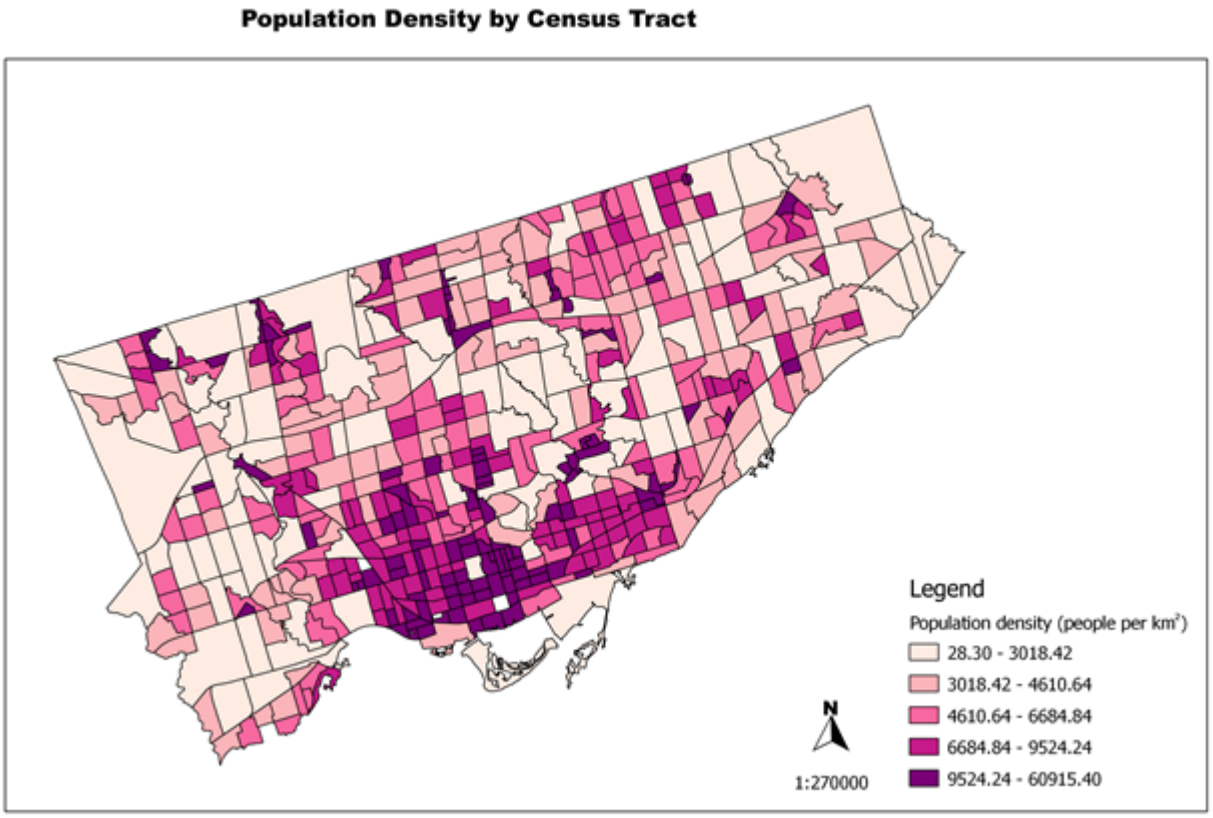

Population Density by Census Tract
Legend
Population density (people per km²)
28.30 - 3018.42
3018.42 - 4610.64
4610.64 - 6684.84
6684.84 - 9524.24
9524.24 - 60915.40
N
1:270000

Figure 9.

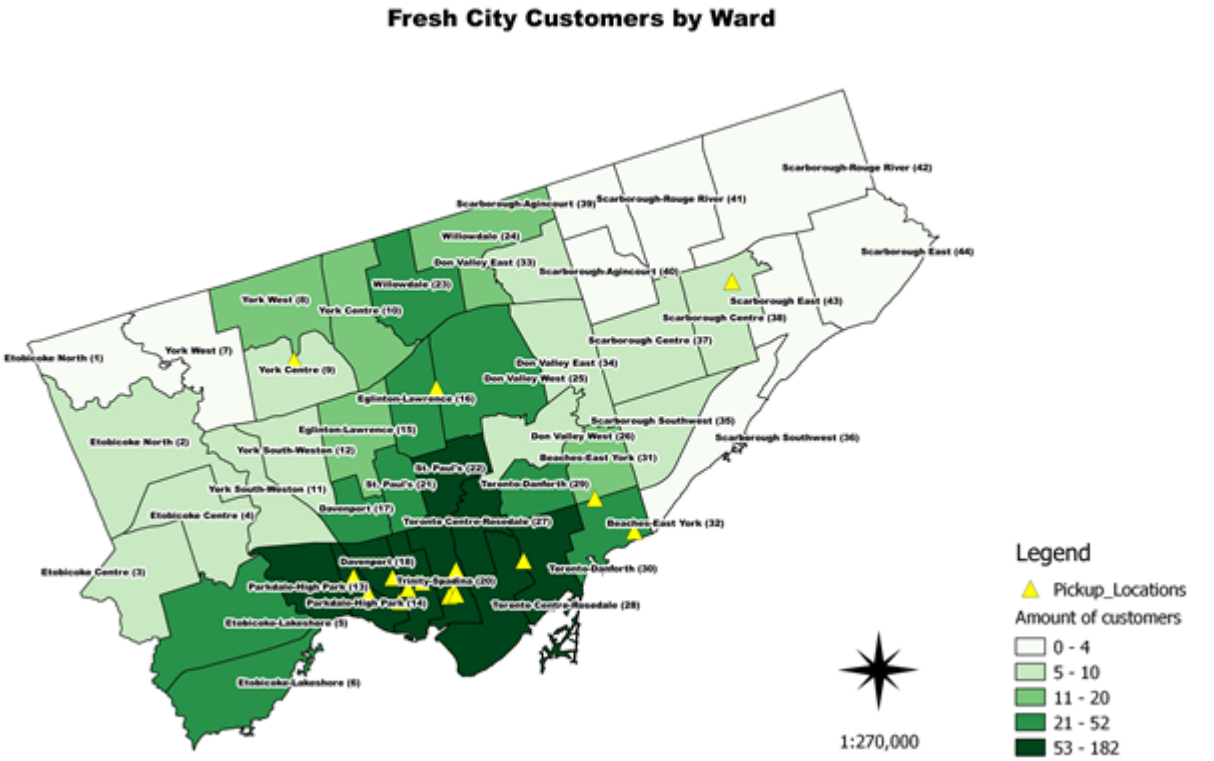

Fresh City Customers by Ward
Scarborough-Rouge River (42)
Scarborough-Agincourt (39)
Scarborough-Rouge River (41)
Willowdale (24)
Scarborough East (44)
Don Valley East (33)
Scarborough-Agincourt (40)
Willowdale (23)
Scarborough East (43)
York West (8)
York Centre (10)
Scarborough Centre (38)
Etobicoke North (1)
York West (7)
Scarborough Centre (37)
York Centre (9)
Don Valley East (34)
Don Valley West (25)
Eglinton-Lawrence (16)
Scarborough Southwest (35)
Eglinton-Lawrence (15)
Don Valley West (26)
Scarborough Southwest (36)
Etobicoke North (2)
York South-Weston (12)
Beaches-East York (31)
St. Paul's (22)
St. Paul's (21)
Toronto-Danforth (29)
York South-Weston (11)
Davenport (17)
Etobicoke Centre (4)
Toronto Centre-Rosedale (27)
Beaches-East York (32)
Davenport (18)
Etobicoke Centre (3)
Toronto-Danforth (30)
Trinity-Spadina (20)
Parkdale-High Park (13)
Parkdale-High Park (14)
Toronto Centre-Rosedale (28)
Etobicoke-Lakeshore (5)
Etobicoke-Lakeshore (6)
1:270,000
Legend
Pickup_Locations
Amount of customers
0 - 4
5 - 10
11 - 20
21 - 52
53 - 182

Figure 10.

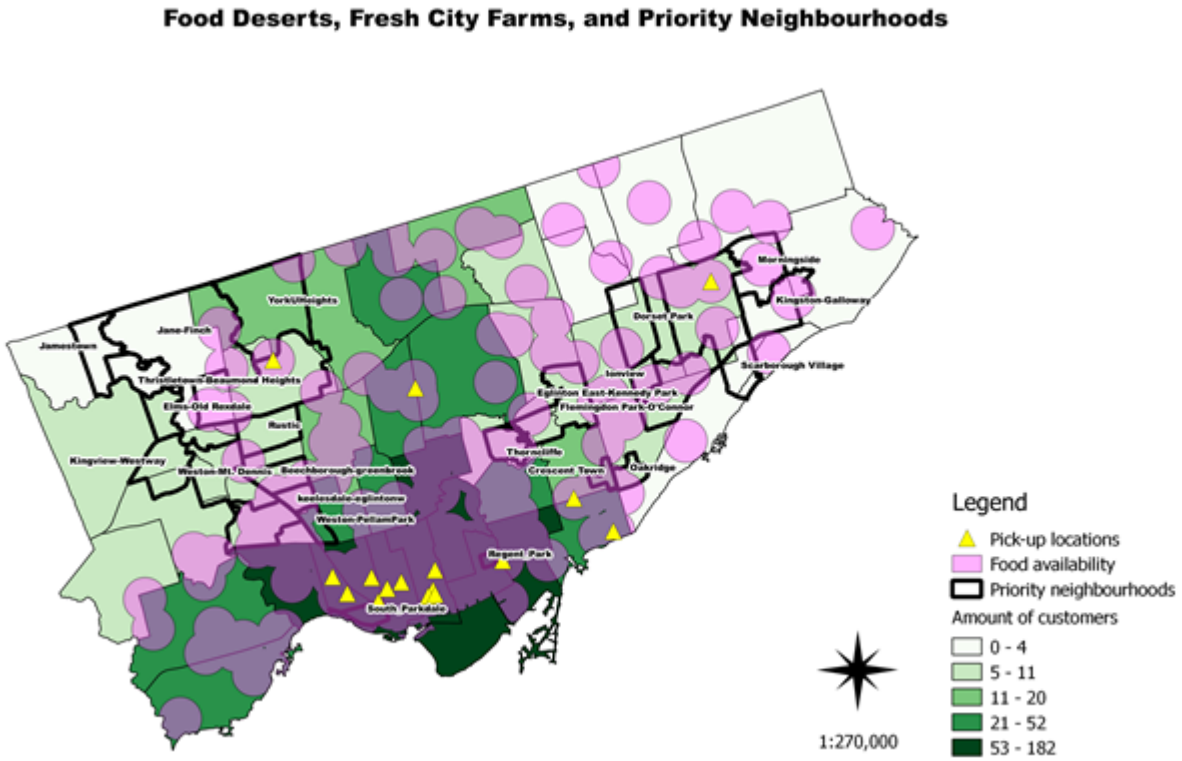

Food Deserts, Fresh City Farms, and Priority Neighbourhoods
Legend
Pick-up locations
Food availability
Priority neighbourhoods
Amount of customers
0 - 4
5 - 11
11 - 20
21 - 52
53 - 182
1:270,000

Figure 11.

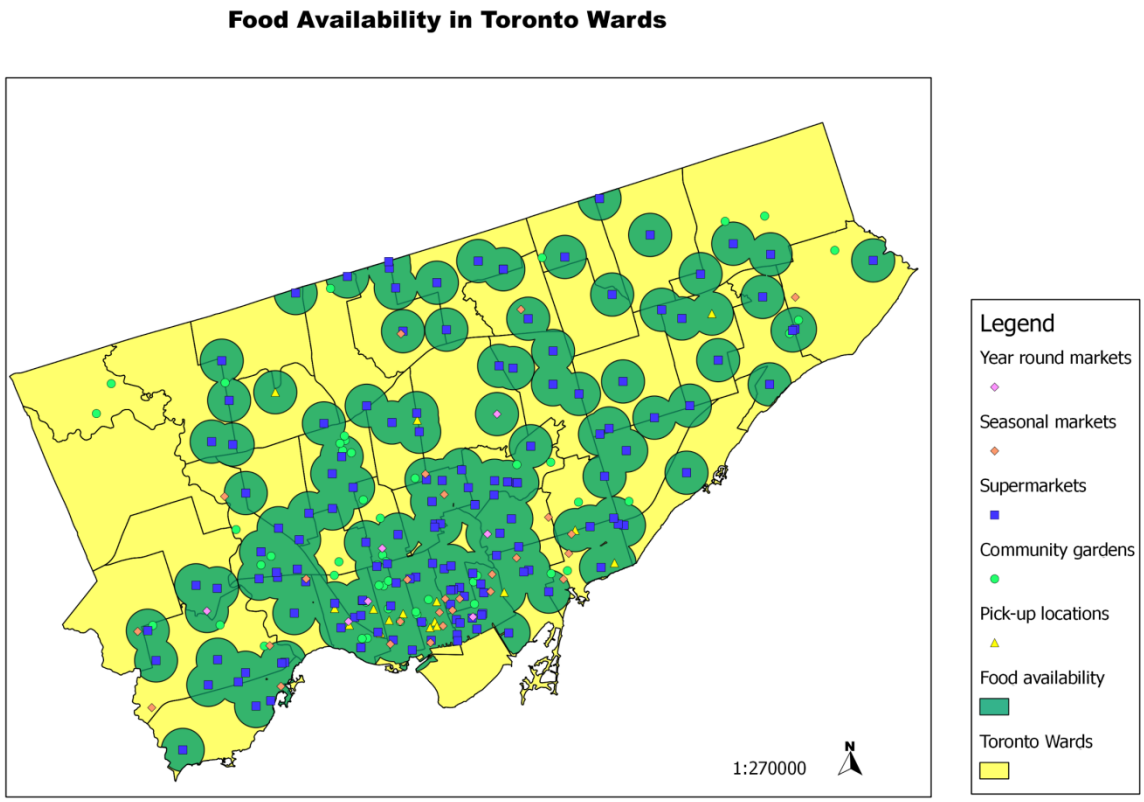

Food Availability in Toronto Wards
1:270000
N
Legend
Year round markets
Seasonal markets
Supermarkets
Community gardens
Pick-up locations
Food availability
Toronto Wards

Figure 12.

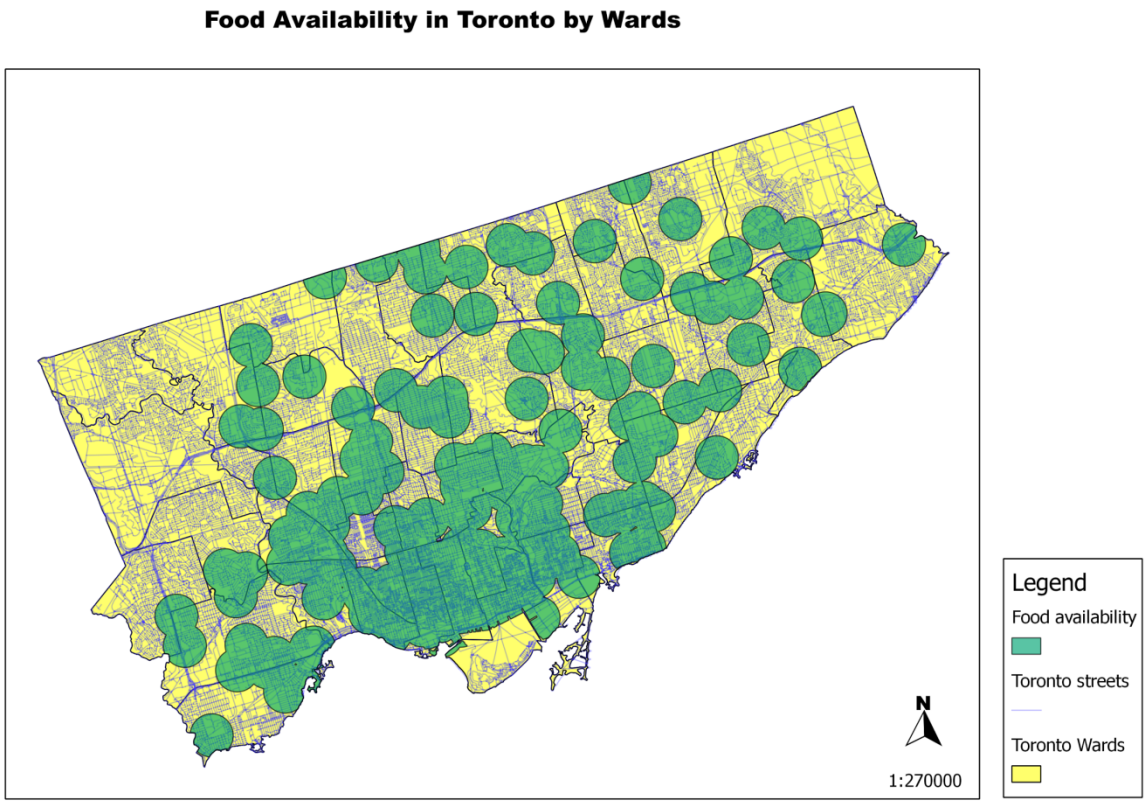

Food Availability in Toronto by Wards
N
1:270000
Legend
Food availability
Toronto streets
Toronto Wards

Figure 13.

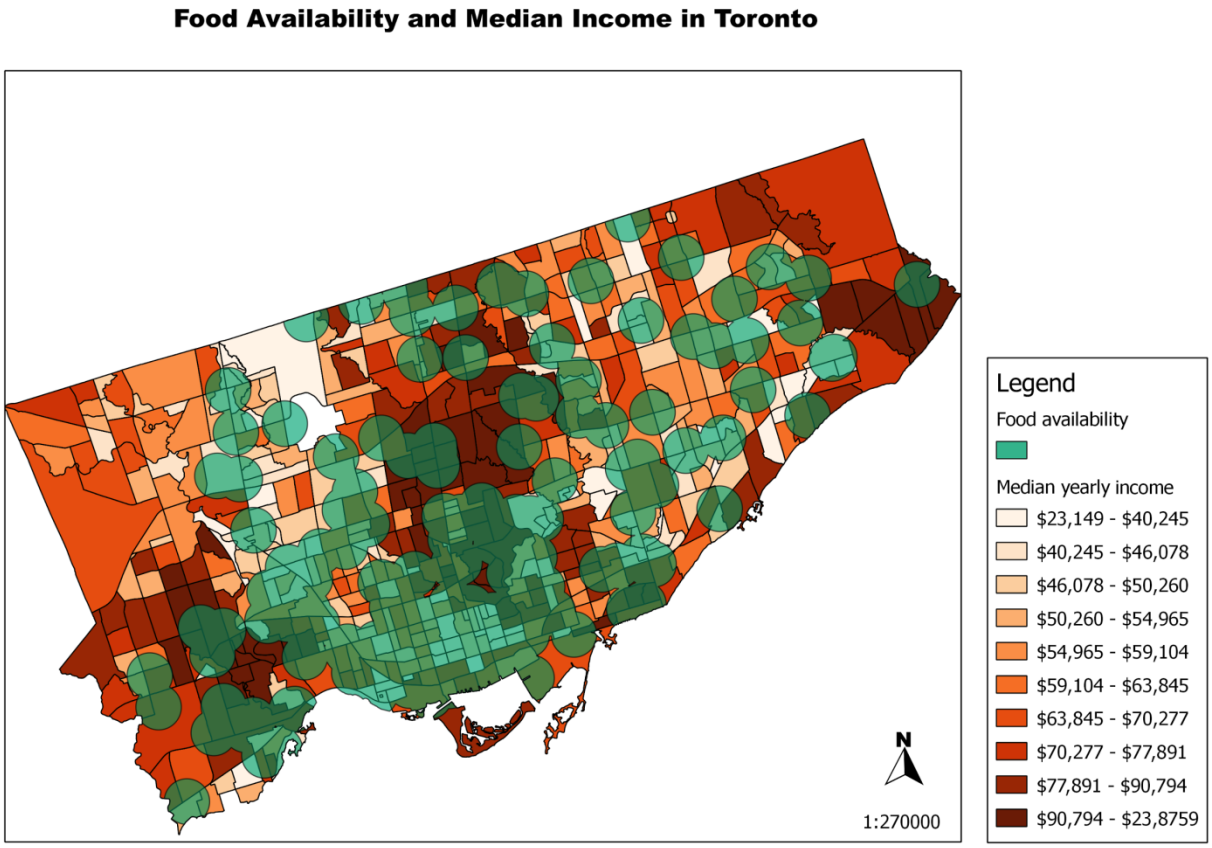
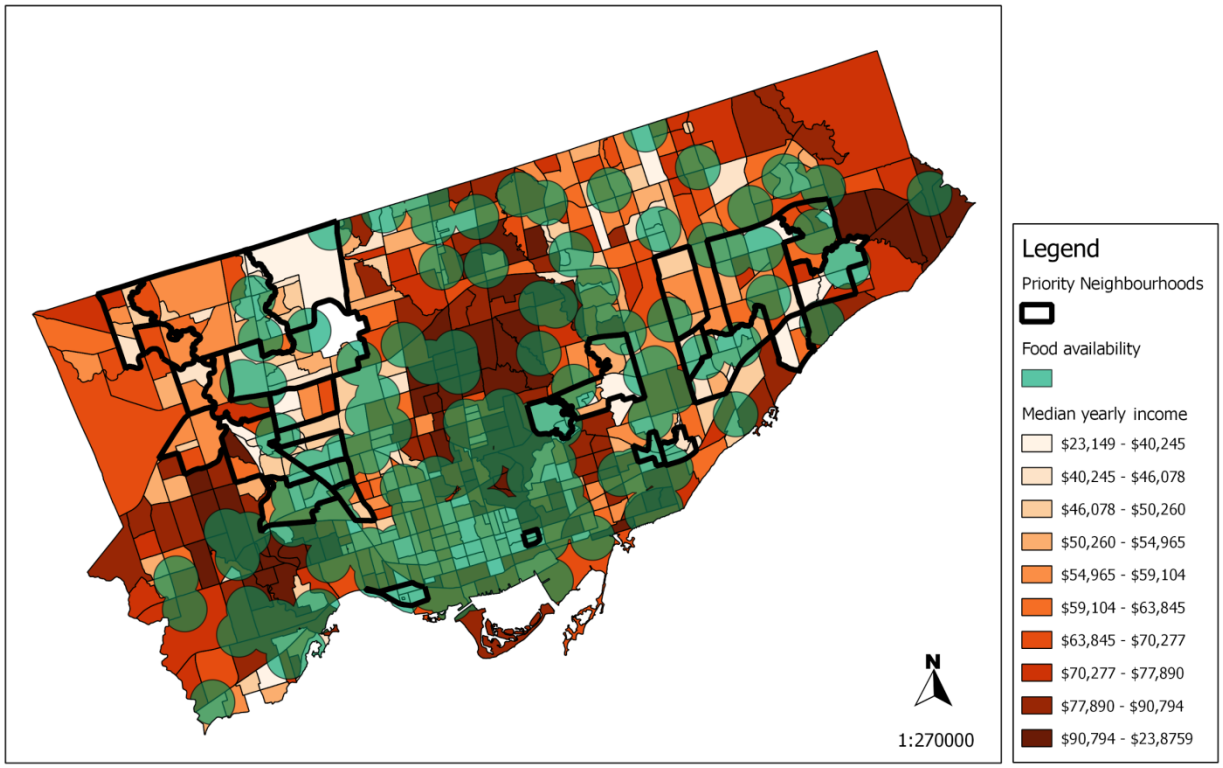

Food Availability and Median Income in Toronto
N
1:270000
Legend
Food availability
Median yearly income
$23,149 - $40,245
$40,245 - $46,078
$46,078 - $50,260
$50,260 - $54,965
$54,965 - $59,104
$59,104 - $63,845
$63,845 - $70,277
$70,277 - $77,891
$77,891 - $90,794
$90,794 - $23,8759

Figure 14.

Food Availability in Toronto: Income and Priority Neighbourhoods



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